organic compound and a hydrophilic and water insoluble thermoplastic resin compound to make a kneaded compound, and dispersing the kneaded compound in a hydrophobic thermoplastic resin.

21. (New) A method of producing a resin composition to be used in a multi-layer laminate for packaging liquid foods, comprising the steps of kneading a hydrophilic reducing organic compound, a porous inorganic compound, and a hydrophilic and water insoluble thermoplastic resin compound, to make a kneaded compound, and dispersing the kneaded compound in a hydrophobic thermoplastic resin.

REMARKS

Claims 1-19 were pending in the above-identified patent application. The title of the invention and the Specification have been amended for clarity. The amendments to Claims 1 and 3 are supported by the specification on page 12, lines 1-10. New claim 20 is supported on page 6-7, lines 1-30 and 1-13. New claim 21 is supported on page 7-8, lines 14-30 and 1-30. No new matter or new issues are contained in the amendments. Based on the foregoing remarks, Applicants respectfully request reconsideration and allowance of the pending and new claims.

Formal Matters

The title has been changed to clearly indicate that the invention is directed to resin compositions to be used in a multi-layer laminate for storing liquid foods. Applicants concur with the Examiner that the resin is intended to be utilized as a component of a multi-layer laminate in order to be an effective liquid food storage container.

The specification has been modified as requested by the Examiner to clarify and correct minor errors. No new matter or new issues are contained in these amendments.

Rejections Under 35 U.S.C. § 112, second paragraph

Claims 1-8 were rejected under 35 U.S.C. § 112, second paragraph, as indefinite for failing to particularly point our and distinctly claim the subject matter which Applicants regard as the invention. The Office Action indicates that the claims are unclear as to how the resin composition may be utilized by itself to store liquid foods.

Applicants have amended Claims 1 and 3 to recite that the resin composition is "to be used in a multi-layer laminate". By definition, a laminate is "a composite made of any one of several types of thermosetting plastic bonded to paper, cloth etc" (The Condensed Chemical Dictionary, 8th Ed. Gessner G. Hawley Editor). As requested by the Examiner, the amendments to the claims clarify that the resin should be utilized as a component of a multi-layer laminate in order to be an

effective liquid food storage container. Therefore, Applicants respectfully request that the objections be withdrawn.

Prior Art Rejections Under 35 U.S.C. § 103

An important feature of the invention as indicated in the claims is that a hydrophilic reducing organic component (component A) is included in a hydrophilic and water insoluble thermoplastic resin (component B). None of the prior art references discloses the kneading of the A component with the B component of the present invention. The A component is protected by the B component which has oxygen gas barrier characteristics. Thus, A is prevented from being consumed by the surrounding oxygen before the resin composition contacts the aqueous liquid food. Therefore, the A component maintains its oxygen absorbing capability. However, when the resin composition contacts the aqueous liquid food, the water component gradually reaches through the C component and decreases the oxygen barrier characteristics of component B. As a result, the A component can then exhibit its oxygen absorbing function (page 12 lines 1-14). Applicants respectfully affirm that these above mentioned features of Claims 1, 3, 20 and 21 are neither disclosed nor suggested in any references cited by the Examiner.

A. Claims 1, 3 and 5-8 were rejected under 35 U.S.C. § 103(a) as being obvious and unpatentable over Koyama et al. (Pat. No. 5,274,024) in view of Blinka et al. (Pat. No. 5,834,079). Also, the Examiner indicates that it would have been obvious to one of ordinary skill in the art to substitute an ascorbic acid for the oxygen scavenger in the laminate taught in Koyama because it is functionally equivalent to the metal oxide utilized in Koyama. Furthermore, the Examiner states that it would have been obvious to one of ordinary skill in the art to incorporate a zeolite into the EVOH blend layer of the laminate taught in Koyama in order to prevent the migration of oxygen scavenging byproducts. Applicants traverse this rejection as follows.

Koyama merely discloses that the oxygen absorbing resin is a blend comprising a vinyl alcohol polymer and an olefin resin in a weight ratio of 1:99~90:10 (Claim 2), and an oxygen scavenger is incorporated in the blend (col. 6, lines 18-21). Blinka merely discloses a film which includes an oxygen scavenger and a zeolite. The oxygen scavenger may be selected from the group which includes ascorbates (Claim 1), and the oxygen scavenger is incorporated into a packaging structure (col. 1, lines 40-50).

A combination of the Koyama and Blinka teachings would not arrive at the three component resin composition of the present invention. Neither of these cited prior art teach the unique aspects of the present invention: the decrease in the oxygen barrier characteristics of

component B and the increase in the oxygen absorbing characteristics of component A which occur only when the resin composition of the present invention comes into contact with aqueous liquid foods. Thus, while the combination of Koyama and Blinka may be functionally similar to the claimed invention, the structural elements differ dramatically. Therefore, the cited art does not provide the motivation to combine these elements to arrive at the present invention. Since the combination asserted by the Examiner would not have successfully arrived at the present invention, Applicants request that the objection be withdrawn.

B. The Examiner rejected Claims 12 and 13 under 35 U.S.C. § 103(a) as being unpatentable over Koyama et al. (Pat. No. 5,274,024) in view of Blinka et al. (Pat. No. 5,834,079) as applied in claims 1, 3 and 5-8 above, and further in view of Moritani et al. (Pat. No. 4,999,229). The Examiner states that it would have been obvious to one of ordinary skill in the art to utilize a ploy olefin with a moisture permability of not more than $20g/m^2$ –day as the inner layer of the laminate taught in Koyama because Moritani teaches that laminates with such inner layers possess superior barrier properties. Applicants traverse this rejection as follows.

Moritani merely discloses a three-layer laminate, comprising an inner layer, an intermediate layer and an outer layer. The inner layer is selected from the group consisting of polyolefin, polyamides, and polyesters (col. 9, lines 21-45). Koyama merely discloses that the oxygen absorbing resin is a blend comprising a vinyl alcohol polymer and an olefin resin in a weight ratio of 1:99~90:10 (Claim 2), and an oxygen scavenger is incorporated in the blend (col. 6, lines 18-21). Blinka merely discloses a film which includes an oxygen scavenger and a zeolite. The oxygen scavenger may be selected from the group which includes ascorbates (Claim 1), and the oxygen scavenger is incorporated into a packaging structure (col. 1, lines 40-50).

A combination of the Moritani, Koyama and Blinka teachings would not arrive at the unique three component resin composition of the present invention. None of the cited prior art teaches about the following: the decrease in the oxygen barrier characteristics of component B and the increase in the oxygen absorbing characteristics of component A which occur only when the resin composition of the present invention comes into contact with aqueous liquid foods. Thus, while the combination of Moritani, Koyama, Blinka may be functionally similar to the claimed invention, the structural elements differ dramatically. The structural elements of Claim 12 and 13 depend ultimately upon Claim 1. Therefore, since the cited art does not provide the motivation to combine these elements to arrive at the present invention, and the rejection should be withdrawn. Therefore in light of the preceding remarks, Claims 12 and 13 should not be rejected under 35 U.S.C. §103(a).

C. Claims 1, 3 and 5-8 were also rejected as being unpatentable over Koyama et al. (Pat. No. 5,274,024) in view of JP-0172416 (assigned to Daiichi Seiyaku Co.) and Teumac et al. (Pat. No. 5,663,223). The Examiner indicates that it would have been obvious to one of ordinary skill in the art to incorporate the oxygen scavenger taught in Daiichi Seiyaku into the EVOH blend layer of the laminate taught in Koyama in order to enhance the oxygen barrier properties of the laminate. Applicants traverse the rejections as follows.

Koyama merely discloses that the oxygen absorbing resin is a blend comprising a vinyl alcohol polymer and an olefin resin in a weight ratio of 1:99~90:10 (Claim 2), and an oxygen scavenger is incorporated in the blend (col. 6, lines 18-21). Daiichi Seiyaku merely discloses that an oxygen scavenger comprises a zeolite, either synthetic or natural, which supports one or more ascorbic or araboascorbic acids, their salts or derivatives thereof. The oxygen scavenger is apparently incorporated into the foodstuff that it is protecting. Teumac merely discloses that oxygen scavengers which were once added directly to foodstuff are being incorporated into the food packing container (col. 3, lines 48+). None of the cited prior art teaches about the following: the decrease in the oxygen barrier characteristics of component B and the increase in the oxygen absorbing characteristics of component A which occur only when the resin composition of the present invention comes into contact with aqueous liquid foods. Therefore, the cited art does not provide the motivation to combine these elements to arrive at the present invention.

Applicants respectfully assert that one of ordinary skill in the art would not arrive at the present invention by combining the teachings of Koyama, Daiichi Seiyaku and Teumac. As indicated above, the present invention has many unique characteristics not taught by any prior art. Thus, the objections to Claims 1 and 3, and dependent claims 5-8 should be withdrawn.

D. Claims 12,13,15 and 16 were rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al. (Pat. No. 5,274,024) in view of JP-0172416 (assigned to Daiichi Seiyaku Co.) and Teumac et al. (Pat. No. 5,663,223) and further in view of Moritani et al. (Pat. No. 4,999,229). The Examiner states that it would have been obvious to one of ordinary skill in the art to utilize a ployolefin with a moisture permability of not more than 20g/m^2 –day as the inner layer of the laminate taught in Koyama because Moritani teaches that laminates with such inner layers possess superior barrier properties. Applicants traverse the rejection as follows.

Koyama merely discloses that the oxygen absorbing resin is a blend comprising a vinyl alcohol polymer and an olefin resin in a weight ratio of 1:99~90:10 (Claim 2), and an oxygen scavenger is incorporated in the blend (col. 6, lines 18-21). Daiichi Seiyaku merely discloses than an oxygen scavenger comprises a zeolite, either synthetic or natural, which supports one or more ascorbic or araboascorbic acids, their salts or derivatives thereof. The oxygen scavenger is

apparently incorporated into the foodstuff that it is protecting. Teumac merely discloses that oxygen scavengers which were once added directly to foodstuff are being incorporated into the food packing container (col. 3, lines 48+). Moritani merely discloses a three-layer laminate, comprising an inner layer, an intermediate layer and an outer layer. The inner layer is selected from the group consisting of polyolefin, polyamides,and polyesters (col. 9, lines 21-45).

For the reasons already described above, Claims 12 and 13 which ultimately depend upon Claim 1, are for a resin composition used in a multilayer laminate with several unique components. None of the cited prior art discloses an A component kneaded into a B component or that both these components undergo changes when the laminate comes into contact with liquid foods.

Claim 15 has been amended to indicate that the composition is directed to a laminate for packaging aqueous liquid foods. As indicated in the background (page 15 lines 3-13), an important feature of the invention is that the laminate for packing aqueous liquid foods comprises a layer made of resin that is prepared by dispersing a porous inorganic compound containing ascorbic acids into hydrophobic thermoplastic resin. The ascorbic acids in the resin layer are stable in the presence of oxygen under dry conditions and normal temperatures. So, it is possible to preserve the above-described function during the storage of the packaging material. However, when filled with aqueous liquid foods, the water component passes through the thermoplastic resin and gradually reaches the supporting porous inorganic compound, whereby the ascorbic acids exhibit an oxygen absorbing function. Therefore, it becomes possible to prevent any degradation of the liquid foods due to the presence of oxygen during storage. Thus, quality is preserved and shelf-life extended when aqueous liquid foods are packaged in a laminate comprising the present composition.

Daiichi Seiyaku discloses porous inorganic compounds containing ascorbic acids. However, Daiichi Seiyaku assumes that ascorbic acids have to be released from porous inorganic compounds to exhibit their oxygen absorbing capability. See attached copy of Japanese and English translation of portions of the same. When the porous inorganic compounds containing ascorbic acids as taught by Daiichi Seiyaku are incorporated in a hydrophobic thermoplastic resin, it is expected that the ascorbic acids would not be released from the porous inorganic compounds. Thus, when the ascorbic acids within the porous inorganic compounds are incorporated in the hydrophobic thermoplastic resin, it is expected that the ascorbic acids would not exhibit any oxygen absorbing capability. Therefore, Applicants believe that another novel feature of the present invention is the incorporation of ascorbic acids into porous inorganic compounds as described on page 13 lines 3-18. The above mentioned features of Claim 15 are neither disclosed nor suggested in any cited references. Since combining the teaching of all of these cited prior art would not arrive

at all of the structural elements of the present invention, the objections to Claims 12, 13, 15 and 16 should be withdrawn.

E. Claims 1, 3, 5-8,10, and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bettle III (Pat. No. 5,320,889) in view of Blinka et al (Pat. No. 5,834,979). The Examiner indicates that it would have been obvious to one of ordinary skill in the art to incorporate an ascorbic acid into the ethylene/EVOHJ blend layer of the laminate taught in Bettle in order to improve the oxygen barrier properties of the package. The Examiner also alleges the it would have been obvious to one of ordinary skill in the art to incorporate a zeolite into the ethylene/EVOH blend layer of the laminate taught in Bettle in order to prevent migration of oxygen scavenging byproducts. Applicants traverse the rejection as follows.

Bettle III merely discloses a laminate comprising an EVOH layer. Blinka merely discloses a film which includes an oxygen scavenger and a zeolite. The oxygen scavenger may be selected from the group which includes ascorbates (Claim 1), and the oxygen scavenger is incorporated into a packaging structure (col. 1, lines 40-50). Claims 5-8, 10 and 11 ultimately depend upon Claim 1. Claim 1 and 3 are for a resin composition used in a multi-layer laminate with several unique components. None of the cited prior art discloses an A component kneaded into a B component or that both these components undergo changes when the laminate comes into contact with liquid foods. Therefore, the cited art does not provide the motivation to combine these elements to arrive at the present invention. Also as indicated above, the present invention has many unique characteristics not taught by any prior art. Since the teachings of Bettle and Blinka would not be successful in arriving at the present invention, the objection should be withdrawn.

F. Claims 1, 3, 5-8, 10 and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bettle III (Pat. No. 5,320,889) in view of JP-0172416 (assigned to Daiichi Seiyaku Co.) and Teumac et al. (Pat. No. 5,663,223). The Examiner indicates that since it is well known that oxygen scavengers can be incorporated in to the layers of polymeric containers, it would be obvious to one skilled in the art to incorporate the oxygen scavenger taught in Daiichi Seiyaku into the ethylene/EVOH blend layer of the laminate taught in Bettle in order to enhance its oxygen barrier properties. Applicants traverse the objection as follows.

Bettle III merely discloses a laminate comprising an EVOH layer. Daiichi Seiyaku merely discloses than an oxygen scavenger comprises a zeolite, either synthetic or natural, which supports one or more ascorbic or araboascorbic acids, their salts or derivatives thereof. The oxygen scavenger is apparently incorporated into the foodstuff that it is protecting. Teumac merely discloses that oxygen scavengers which were once added directly to foodstuff are being

incorporated into the food packing container (col. 3, lines 48+). Thus, the cited art does not provide the motivation to combine these elements to arrive at the present invention.

Claims 5-8, 10 and 11 ultimately depend upon Claim 1. Claim 1 and 3 are for a resin composition used in a multi-layer laminate with several unique components. None of the cited prior art discloses an A component kneaded into a B component or that both these components undergo changes when the laminate comes into contact with liquid foods. Therefore, the cited art does not provide the motivation to combine these elements to arrive at the present invention. Since combining the teaching of all of these cited prior art would not arrive at all of the structural elements of the present invention, the objections should be withdrawn.

G. Claims 1, 3 and 5-9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lofgren et al. (Pat. No. 5,133,999) in view of Blinka et al. (Pat. No. 5, 834,079). The Examiner indicates that it would have been obvious to one skilled in the art to incorporate an ascorbic acid into the barrier layer of the laminate taught in Lofgren in order to improve the oxygen permeability of the package. Furthermore, the Examiner states that it would also have been obvious to incorporate a zeolite into the barrier layer of the laminate taught in Lofgren in order to prevent the migration of oxygen scavenging byproducts. Applicants traverse the objections as follows.

Lofgren merely discloses a layer consisting of a mixture of polyethylene and ethylene vinyl alcohol copolymer (col. 4, lines 61-68). Blinka merely discloses a film which includes an oxygen scavenger and a zeolite. The oxygen scavenger may be selected from the group which includes ascorbates (Claim 1), and the oxygen scavenger is incorporated into a packaging structure (col. 1, lines 40-50). Thus, the cited art does not provide the motivation to combine these elements to arrive at the present invention.

Claims 5-8, 10 and 11 ultimately depend upon Claim 1. Claim 1 and 3 are for a resin composition used in a multi-layer laminate with several unique components. None of the cited prior art discloses an A component kneaded into a B component or that both these components undergo changes when the laminate comes into contact with liquid foods. Thus, the invention is not obvious since combining Lofgren and Blinka would not arrive at all of the structural features of the present application which has many unique characteristics not taught by any prior art. Since the teachings of Lofgren and Blinka would not be successful in arriving at the present invention, the objection should be withdrawn.

H. Claims 1, 3, 4-9, 14 and 17-19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lofgren et al. (Pat. No. 5,133,999) in view of JP-0172416 (assigned to Daiichi Seiyaku Co.) and Teumac et al. (Pat. No. 5,663,223). The Examiner indicates that it would have

been obvious to one of ordinary skill in the art to incorporate the oxygen scavenger taught in Daiichi Seiyaku into the regrind layer of the laminate taught in Lofgren in order to enhance the laminate's oxygen barrier properties. Applicants traverse the objections as follows.

Daiichi Seiyaku merely discloses than an oxygen scavenger comprises a zeolite, either synthetic or natural, which supports one or more ascorbic or araboascorbic acids, their salts or derivatives thereof. The oxygen scavenger is apparently incorporated into the foodstuff that it is protecting. Lofgren merely discloses a layer consisting of a mixture of polyethylene and ethylene vinyl alcohol copolymer (col. 4, lines 61-68). Teumac merely discloses that oxygen scavengers which were once added directly to foodstuff are being incorporated into the food packing container (col. 3, lines 48+). Thus, the cited art does not provide the motivation to combine these elements to arrive at the present invention.

Claims 4-9 ultimately depend upon Claim 1. Claim 1 and 3 are for a resin composition used in a multi-layer laminate with several unique components. None of the cited prior art discloses an A component kneaded into a B component or that both these components undergo changes when the laminate comes into contact with liquid foods. Thus, the invention is not obvious since combining the cited art would not arrive at all of the structural features of the present application.

Claims 17-19 ultimately depend upon Claim 14. Claim 14 has been amended to indicate that the composition is directed to a laminate for packaging aqueous liquid foods. As indicated in the background (page 15 lines 3-13), an important feature of the invention is that the laminate for packing aqueous liquid foods comprises a layer made of resin that is prepared by dispersing a porous inorganic compound containing ascorbic acids into hydrophobic thermoplastic resin. The ascorbic acids in the resin layer are stable in the presence of oxygen under dry conditions and normal temperatures. So, it is possible to preserve the above-described function during the storage of the packaging material. However, when filled with aqueous liquid foods, the water component passes through the thermoplastic resin and gradually reaches the supporting porous inorganic compound, whereby the ascorbic acids exhibit an oxygen absorbing function. Therefore, it becomes possible to prevent any degradation of the liquid foods due to the presence of oxygen during storage. The above mentioned features of Claim 14 are neither disclosed nor suggested in any cited references.

Daiichi Seiyaku discloses porous inorganic compounds containing ascorbic acids. However, Daiichi Seiyaku assumes that ascorbic acids have to be released from porous inorganic compounds to exhibit their oxygen absorbing capability. See attached copy of Japanese and English translation of portions of the same. When the porous inorganic compounds containing ascorbic acids as taught by Daiichi Seiyaku are incorporated in a hydrophobic thermoplastic resin,

it is expected that the ascorbic acids would not be released from the porous inorganic compounds. Thus, when the ascorbic acids within the porous inorganic compounds are incorporated in the hydrophobic thermoplastic resin, it is expected that the ascorbic acids would not exhibit any oxygen absorbing capability. Therefore, Applicants believe that another novel feature of the present invention is the incorporation of ascorbic acids into porous inorganic compounds as described on page 13 lines 3-18. Since combining the teaching of all of the cited prior art would not arrive at all of the unique aspects of the present invention, the objections should be withdrawn.

I. Claims 1, 3, 5-8, 9-11, 14 and 17-19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Itamura et al. (Pat. No. 5,133,999) in view of JP-0172416 (assigned to Daiichi Seiyaku Co.) and Teumac et al. (Pat. No. 5,663,223). The Examiner indicates that it since it is well known that oxygen scavengers can be incorporated into the layer of polymeric container, it would have been obvious to one of ordinary skill in the art to incorporate the oxygen scavenger taught in Daiichi Seiyaku into the ethylene/EVOH layer of the laminate taught in Itamura in order to enhance the laminate's oxygen barrier properties. Applicants traverse the rejection as follows.

Itamura merely discloses that a composition comprises a polyolefin and a saponified product of ethylene-vinyle acetate copolymer (abstract), in a ratio between 65:35 to 99.7:0.3 (col. 4, lines 61-65). The ethylene-vinyl acetate copolymer has a saponification degree of at least 96% (abstract), and the blend may be utilized in laminates (col. 9, lines 1-9). Daiichi Seiyaku merely discloses than an oxygen scavenger comprises a zeolite, either synthetic or natural, which supports one or more ascorbic or araboascorbic acids, their salts or derivatives thereof. The oxygen scavenger is apparently incorporated into the foodstuff that it is protecting. Teumac merely discloses that oxygen scavengers which were once added directly to foodstuff are being incorporated into the food packing container (col. 3, lines 48+). Thus, the cited art does not provide the motivation to combine these elements to arrive at the present invention.

Claims 5-11 ultimately depend upon Claim 1. Claim 1 and 3 are for a resin composition used in a multi-layer laminate with several unique components. None of the cited prior art discloses an A component kneaded into a B component or that both these components undergo changes when the laminate comes into contact with liquid foods. Thus, the invention is not obvious since combining the cited art would not arrive at all of the structural features of the present application.

Claims 17-19 ultimately depend upon Claim 14. Claim 14 has been amended to indicate that the composition is directed to a laminate for packaging aqueous liquid foods. As indicated in the background (page 15 lines 3-13), an important feature of the invention is that the laminate for packing aqueous liquid foods comprises a layer made of resin that is prepared by dispersing a

porous inorganic compound containing ascorbic acids into hydrophobic thermoplastic resin. The ascorbic acids in the resin layer are stable in the presence of oxygen under dry conditions and normal temperatures. So, it is possible to preserve the above-described function during the storage of the packaging material. However, when filled with aqueous liquid foods, the water component passes through the thermoplastic resin and gradually reaches the supporting porous inorganic compound, whereby the ascorbic acids exhibit an oxygen absorbing function. Therefore, it becomes possible to prevent any degradation of the liquid foods due to the presence of oxygen during storage. The above mentioned features of Claim 14 are neither disclosed nor suggested in any cited references.

Daiichi Seiyaku discloses porous inorganic compounds containing ascorbic acids. However, Daiichi Seiyaku assumes that ascorbic acids have to be released from porous inorganic compounds to exhibit their oxygen absorbing capability. See attached copy of Japanese and English translation of portions of the same. When the porous inorganic compounds containing ascorbic acids as taught by Daiichi Seiyaku are incorporated in a hydrophobic thermoplastic resin, it is expected that the ascorbic acids would not be released from the porous inorganic compounds. Thus, when the ascorbic acids within the porous inorganic compounds is incorporated in the hydrophobic thermoplastic resin, it is expected that the ascorbic acids would not exhibit any oxygen absorbing capability. Therefore, Applicants believe that another novel feature of the present invention is the incorporation of ascorbic acids <u>into</u> porous inorganic compounds as described on page 13 lines 3-18. Since combining the teaching of all of the cited prior art would not arrive at all of the compositional elements of the present invention, the objections should be withdrawn.

J. Claims 1, 3, 5-8, and 9-11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Itamura et al. (Pat. No. 5,133,999) in view of in view of Blinka et al. (Pat. No. 5, 834,079). The Examiner indicates that it would have been obvious to one of ordinary skill in the art to incorporate an ascorbic acid into the regrind layer of the laminate taught in Itamura in order to improve the oxygen permeability of the package. Furthermore, the Examiner states that it would have been obvious to one of ordinary skill in the art to incorporate a zeolite in the regrind layer of the laminate taught in Itamura in order to prevent migration of oxygen scavenging byproducts.

Itamura merely discloses that a composition comprises a polyolefin and a saponified product of ethylene-vinyle acetate copolymer (abstract), in a ratio between 65:35 to 99.7:0.3 (col. 4, lines 61-65). The ethylene-vinyl acetate copolymer has a saponification degree of at least 96% (abstract), and the blend may be utilized in laminates (col. 9, lines 1-9). Blinka merely discloses a film which includes an oxygen scavenger and a zeolite. The oxygen scavenger may be selected

from the group which includes ascorbates (Claim 1), and the oxygen scavenger is incorporated into a packaging structure (col. 1, lines 40-50). Thus, the cited art does not provide the motivation to combine these elements to arrive at the present invention.

Claims 5-8 and 9-11 ultimately depend upon Claim 1. Claim 1 and 3 are for a resin composition used in a multi-layer laminate with several unique components. None of the cited prior art discloses an A component kneaded into a B component or that both these components undergo changes when the laminate comes into contact with liquid foods. Thus, the invention is not obvious since combining Itamura and Blinka would not arrive at all of the structural features of the present application. Also as indicated above, the present invention has many unique characteristics not taught by any prior art. Therefore, applicants respectfully request that the objections be withdrawn.

K. Claims 2 and 4 were rejected under 35 U.S.C. 103(a) as being unpatentable over any of the above combination of references and further in view of Hofeldt el al. (Pat. No. 5,204,389). The Examiner indicates that since Hofeldt teaches that an effective amount of ascorbate for the purpose of the oxygen scavenging is between 0.5-10wt%, it would have been obvious to one of ordinary skill in the art to utilize such amounts of ascorbate in the above taught laminates. Applicants traverse the objections as follows.

Hofeldt merely discloses a film for a container closure comprising ascorbates or mixtures thereof (col. 5, lines 3-7). The amount of scavenger is at least 0.5 wt % based on the polymeric matrix material, and it is generally at least 1% (col. 5, lines 51-55). None of the combinations cited above teach that the oxygen scavenger should be contained in amounts raging from 0.05-10wt% of the resinous composition. Therefore, the cited art does not provide the motivation to combine these elements to arrive at the present invention.

Claims 2 and 4 depend upon Claims 1 and 3. Claim 1 and 3 are for a resin composition used in a multi-layer laminate with several unique components. None of the cited prior art discloses an A component kneaded into a B component or that both these components undergo changes when the laminate comes into contact with liquid foods. As already indicated above, a person skilled in the art would not be motivated to combine Daiichi Seiyaku with Lofgren, Itamura, Koyama, Teumac or Hofeldt to obtain all of the compositional features of the present invention. In any case, the combinations asserted would not be successful in arriving at all of the structural elements of claims 2 and 4. Thus, the rejections should be withdrawn.

Referring to the arguments made above in connection with rejection under 35 U.S.C. § 103, dependent claims 2,4, 5-13 and 16-19 include further elements which, in combination with the elements of the allowable claims from which they depend, further distinguish the prior art.

CONCLUSION

No additional fees are believed due; however, the Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 10-1215.

The foregoing is submitted as a full and complete Response to the Office Action mailed April 5, 1999. This Response places all claims in the present application in condition for allowance, and such action is courteously solicited. The Examiner is invited and encouraged to contact the undersigned attorney of record if such contact will facilitate an efficient examination and allowance of the application.

Respectfully submitted,

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Laid-Open Japanese Patent 81-96686 (Daiichi Seiyaku)

Page 2, left upper column, line 9-right upper column, line 7

Indirect additives are designed such that a chemical in question is adsorbed or occluded by a support as much as possible. When it is put in foods, the chemical is released and demonstrates its capability. However, as for ascorbic acids, a suitable support was not found. Therefore it has not been actually used.

In view of the foregoing, the present inventors earnestly investigated indirect additives containing ascorbic acids. As a result, the present inventors found that zeolites sufficiently absorb ascorbic acids, and the zeolite support absorbing the ascorbic acids has superior capability as indirect additives for food preservation.

That is, the present inventors found the following. Zeolites do not only adsorb ascorbic acids but also act as vapor adjusting agents so that in the presence of vapor contained in the foods, zeolites gradually release the anti-oxidant agents adsorbed by zeolites.

Page 3, right upper column, lines 11-13

When the food preservation compounds of the present invention is used, the anti-oxidant agent support prepared by the foregoing method are filled into small bags that breathes well.

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⑤食品用変質防止剤

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明 細 書

1.発明の名称

食品用変質防止剤

2.特許請求の範囲

アスコルビン酸若しくはアラボアスコルビン酸又はこれらの塩類若しくはアシル誘導体を吸着させたゼオライト類担持体からなる食品用変質防止剤。

3.発明の詳細な説明

本発明は、食品に直接添加、混合することなく、食品と間接的に存在させることにより食品の変質防止を創した間接添加剤即ちアスコルビン酸若しくはアラボアスコルビン酸又はこれらの塩類若しくはアシル誘導体(以下これらをアスコルビン酸類と称す。)を吸着させたゼオライト類担持体からなる食品用変質防止剤に関する。

本発明の間接添加剤は特に油脂食品の酸化防止の目的に使用され、食品の嗜好的価値、栄養的価値及び衛生的安全度など食品の品質を保つに有用な食品用変質防止剤である。

従来、フライ物、揚げ菓子などの油脂食品の酸化防止効果はフライ油の中に添加された抗酸化剤例えばBHA(Butylated Hydroxyanisole)、BHT(Butylated Hydroxytoluene)あるいはビタミンEなどにより期待されているが、食品を該フライ油にて加熱処理する際に前述の抗酸化剤は急速に揮散及び分解し、その効果は満足できるものでないことが周知である(衆栗と食糧、18巻、82頁(1960)初本著)。

又、アスコルビン酸類の中には、油脂食品の酸化防止剤として実用に供されているものもあるが、食品に直接添加した場合、該食品中の重金属イオンやアミノ酸あるいは該食品の酸性などにより分解を起し、酸化防止効果が弱まるおそれがある。更に、この分解反応を考慮して量を増大すれば食品の味、香気、風味あるいは色などにも悪影響を与えることも考えられる。あるいは分解反物の蓄積による弊害も懸念されている。

このような観点から種々の酸化防止剤の間接添加法が試みられている。その代表的なものとしてはBHTの包装紙への適用（Modern Packaging，32巻，111頁（1959），Caldwellほか）あるいはBHA吸収紙の間接添加（日本食品工業学会誌，16巻，72頁（1967），梶本ほか）などが挙げられる。

しかしながら，抗酸化剤の中で最も安全性の高いアスコルビン酸類の間接添加については知られていない。本来，間接添加剤は目的の物品を可能な限り担体に吸着，脱離させ，且つ食品と共存させた際に，徐々に該物品を脱離してその効果を発揮することを期したものであるが，アスコルビン酸類については相応しい担体が不明であった。故にその実用化に至っていない。

本発明者らはこのような見地からアスコルビン酸類の間接添加について鋭意検討した結果，アスコルビン酸類をゼオライト剤に極めて良好に吸着させうること及びこれらを吸着したゼオライト含有担体が食品の変質防止のための間接

添加剤として優れた効果を有することを知見し本発明を完成したのである。

即ち，ゼオライト類はアスコルビン酸類を良好に吸着するのみならず，放気圧的徐剤としての機能を有し，食品中の水分によって一旦吸着された前記抗酸化剤を徐々に放出することを見い出したのである。

本発明の食品用変質防止剤を調製するに際しては，アスコルビン酸類の各種溶液又は懸濁液を用い，これらにゼオライト類を前記抗酸化剤の1乃至50倍量特に5乃至10倍量を作用させればよい。吸着温度には特に制限はない。

本発明に用いるアスコルビン酸類としては，アスコルビン酸及びアラボアスコルビン酸はもとより，これらの塩類（Naやk塩など），アシル誘導体（ステアロイルやパルミトイル誘導体など）などが挙げられる。

ゼオライト類としては天然のクリノプチロライトやモルデナイト類のゼオライトや合成ゼオライト（4A型，5A型，13X型及びY型な

と）が使用できるが，細孔径の比較的大きな合成ゼオライト類（13X型及びY型など）が目的物の吸着力の面から望ましい。更に，ゼオライト類は一般に水を吸着しているので，吸着が阻害されない程度の活性化処理例えば200℃，2時間処理が必要である。

担持体調製に際する使用溶媒としては水，アルコール類，エーテル類，芳香族炭化水素類（ベンゼン，キシレンなど），脂肪族炭化水素類（n－ヘキサンなど），脂肪族ケトン類（アセトンなど）あるいはハロゲン化炭化水素類（クロロホルムなど）などが用いられる。しかし，ゼオライト類は周知のごとく極性分子に対し選択吸着作用を示すので，極性溶媒或いは極性の低い溶媒を用いる方が望ましい。

以上のごとく調製した担持体は即席麺，オコノミアラレ，フライ豆，ピーナッツ，カリントなどの油脂食品類の間接的抗酸化剤として使用されるのみでなく，茶，アサクサノリや青ノリなどの海藻食品，野菜類などの鮮度保持あるいは魚貝類の鮮度保持，オキアミの黒変防止などにも使用できる。

本発明の食品用変質防止剤の有用性は下記する実験方法などで確認された。

即ち，抗酸化剤としてアスコルビン酸モノステアレートを用い，これをゼオライト13X型に吸着・担持せしめ，本担持体を間接的にインスタントラーメンに加え，そのシェルライフの延長を調べた。実験に供したインスタントラーメンは市販生ラーメンを用い，抗酸化剤無添加のサラダオイルでフライ温度160～150℃，フライ時間90～180秒／1食で揚げた後，粉砕したもので，水分6.8%，油分18.8%，過酸化物価16.1（工業化学雑誌，61巻10号，1557（1958）の方法にて測定）のものである。

更に詳述すると，本実験は前記インスタントラーメン80gを部分的着色印刷をした表面白色不透明の酸素非透過性複層包装袋に入れたものを1群10袋調製し，これらに前記担持体

各々4gを穴あきポリエチレン袋に充填したものを各々同封後，シールし，40℃1ヶ月間螢光灯照射（80ワット×6：距離60cm）した。尚，1日おきに袋の内容物はよく混合し，均等に螢光灯照射が行なわれるようにした。1つの試料袋を6日おきに取り出し，過酸化物価を測定した。実験の対照にはアスコルビン酸モノステアレート無添加のゼオライト13X型を用い同様に実験を行った。本実験結果を表1に示した。

表1 インスタントラーメンの螢光灯試験過程における過酸化物価の変化

日数	過酸化物価		日数	過酸化物価	
	A	B		A	B
0	10.1	10.1	30	68	58
6	23	16.5	36	72.5	28
8	82	31	38	80	34
12	62	245	80	88	34
18	53	85			

つ安全性の極めて高いゼオライト担持体の大きな保持力を利用しての長期持続性抗酸化機能を有する食品用変質防止剤を提供するものである。

以下，実施例を挙げて本発明を詳細に説明する。

実施例1

アスコルビン酸モノステアレート3.0gをn-ヘキサン100mlに溶解後，ゼオライト13X型10gを加え，時々攪拌しつつ室温暗所に8日間吸着試験を行った。本吸着実験によってアスコルビン酸モノステアレートの1.7gがゼオライト13X型に吸着された。

ここに得られたアスコルビン酸モノステアレート担持ゼオライト13X型を用い，インスタントラーメンの抗酸化試験を行った。その結果は前記表1に示した通りである。

実施例2

ビーカーの左室にアスコルビン酸2.5g，右室に合成ゼオライトY型10g（300℃，3時間減圧処理）を入れ，n-ヘキサンを両者混合

A：アスコルビン酸モノステアレート担持ゼオライト13X型存在下

B：アスコルビン酸モノステアレート担持ゼオライト13X型存在下

表1に見られるごとく，アスコルビン酸モノステアレート担持ゼオライト13X型は無担持体に比べ，過酸化物価の上昇を顕著に抑制しており，油脂食品のシェルライフの延長に極めて有用であることが判明した。

本発明の食品用変質防止剤の使用に際しては一般に前記方法により調整した抗酸化剤担持体を通気性を有する小袋に充填し使用する。食品の保存に際しては食品を前記抗酸化剤担持体充填の小袋と共に酸素非透過性複層袋の3乃至5層積層した包装材料にて包装するかあるいは缶詰包装すればよい。

本発明は，食品のシェルライフの延長，即ち食品の味，香気，風味あるいは色などの品位を長期間保持するために有用な開発添加剤として安全性の極めて高い前記抗酸化剤を使用し，且

することなきよう徐々に加え，左右両けん溝液を別個に攪拌しつつ室温に72時間吸着実験を行った。左室のアスコルビン酸は右側のゼオライトY型に吸着されたため，完全に消失した。

次いで前記アスコルビン酸担持ゼオライトY型を用いて本文中記載のインスタントラーメンの抗酸化試験を行なったところ，その30日後の過酸化物価は次のとおりであった。尚，対照としてアスコルビン酸無担持ゼオライトY型（ゼオライトY型単体）存在下及び何添加のものを同時に検討した。

表2 インスタントラーメンの30日後の過酸化物価

条件	過酸化物価
アスコルビン酸担持ゼオライトY型の存在下	31
ゼオライトY型単体の存在下	88
無添加	85
実験開始時	16

実施例3

実施例3と同様に処理して得られたフラボアスコルビン酸のゼオライト18X型担持体を用いてカリントの抗酸化試験を行った（カリントは新宿中村屋製のもので，2809缶入ラミネート処理PPの袋に入れ缶入，製造3日後の品である。）。

次いでカリント1缶に前記担持体1.0g入り穴あきポリエチレン袋を加え開缶後，室温に130日間放置し，ゼオライト18X型単体存在下及び無添加のものと味，表面，外観の変化ならびに過酸化物価を比較した結果は次のとおりであった。

表3 カリントの130日後の外観，味覚及び過酸化物価

条件	表面外観	味覚	過酸化物価
フラボアスコルビン酸担持ゼオライト18X型の存在下	乾燥状態	通常	3.5
ゼオライト18X型単体の存在下	やや乾燥状態	少し香味有り	5.0
無添加	表面ツヤ消失	香味強し	8.5
実験開始時			3.1

表4 インスタントラーメンの60日後の表面外観及び過酸化物価

条件	表面外観	過酸化物価
アスコルビン酸担持ゼオライトY型の存在下	表面退色	12.0
ゼオライトY型単体の存在下	両面退色	99.0
無添加	両面退色	87.6
実験開始時	殆ど変色	1.1

実施例5

アスコルビン酸2.5g及び合成ゼオライトY型10gを用いて実施例2同様に処理したアスコルビン酸担持ゼオライトY型（担持率100%）に，水100mlを加え，室温にて1時間撹拌後，遠心分離を行ない上澄液を得る。この抽出操作をさらに1回繰り返し，得られた上澄液を先の上澄液と合わせ，次いで水にて全容量300mlとする。ヨウ素滴定により上澄液のアスコルビン酸溶出量を求めると2.489（溶出率99.5%）であった。

本実験からゼオライト単体がアスコルビン酸類

実施例4

アスコルビン酸モノステアレート2.0gをエーテル100mlに溶解後，ゼオライトY型10gを加え，冷蔵庫中時々撹拌しつつ8日間吸着反応を行った。本吸着操作によってアスコルビン酸モノステアレートの1.7gがゼオライトY型に吸着された。

ここに得られたアスコルビン酸モノステアレート担持ゼオライトY型を用いて実施例1に準じインスタントラーメンの抗酸化試験を行った。但し，保存条件は室温下自然放置とし，試験後を刺激臭に変色を上にし60日間とした。その結果，被膜外観及び過酸化物価は次のとおりであった。尚，実験の対照として無担持ゼオライトY型を使用したほか，無添加のものも同時に検討した。

の吸着・徐放力に優れ，且つ吸着・徐放されたアスコルビン酸類を水分により容易に溶出することを確認した。